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Methods Of Improving Higher Education Through Innovative Learning Models And Maintaining High Quality Standards

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Abstract- *Education neither begins nor stops at the University. Higher education is concerned with the refinement of the mind, with living gracefully with partial knowledge. Today we are living in a knowledge world where intellectual capital plays a very important role. Educational Institutions being the home of intellectual capital can play a vital role in knowledge sharing and disseminating. The role of higher education in stimulating national economic growth and the value of international students to national economies exacerbates the need to ensure quality within Higher Education. These forces demand that quality assurance processes are both rigorous and transparent, and that quality enhancement initiatives are firmly embedded in any quality management programmer. Quality has begun to replace effectiveness as institutional level variable in higher education. Quality is the key for success and deploying quality in engineering education leads to better outcome for the institutions. One of the major tools that can be used in the graduate level to achieve the expectations of the recruiters is "QFD (Quality Function Deployment)". Developing and scaling innovative learning models helps address education priorities by employing novel approaches to meeting student learning needs but in the same time one has to maintain the quality standards of education. Important strategies are necessary to achieve our nation's education goals that include online and blended learning; high - access, technology - rich learning environments; and personalized learning models, e-learning, virtual learning, self-motivated project works, digital and open content. This research aims to provide the institutions of higher education a new dimensional teaching standard based on comprehensive quality standards that have been developed for each member of teaching in higher education institutions.*

I INTRODUCTION

Education has been the main instrument of human development and its importance has been emphasized through fundamental rights, principles, statutes / acts in a number of countries. At the international level, attempts have been made at various congregations to focus on aspects of education as a part of fundamental human right.India has witnessed tremendous development in educating and training its vast human resource of over one billion through sustained effort of conventional and distance mode of education. In pursuit of making Right to Education a reality, the Government has been initiating efforts for developing the educational infrastructure and training human capital. Consequently, the Country is with a literacy rate of 64.84%, at higher education level.

Recently Indian education focuses on efforts of improving the career opportunities of graduates and college readiness, initiatives, science technology, engineering and mathematics (STEM) project-based collaborative learning, digital and open content, and dropout prevention programs.

Despite these challenges, the predominant model of engineering education remains similar to that practiced in the 1950's - "chalk and talk", with large classes and single-discipline, lecture-based delivery the norm, particularly inthe early years of study. It is about

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teaching a student how to open a tap not about filling a bucket! The primary purpose is not to train the student to be fit for employment in any specific industry. The university emphasizes unity in knowledge while the industry thrives on differences. So while being sensitive to the needs of the industry the university concentrates on wholeness of knowledge and even while pursuing narrow specializations in research, driving force continues to be intellectual curiosity than market goals.

Developments in student-centred learning such as problem-based and project-based learning have so far had relatively little impact on mainstream engineering education. This paper begins by examining the critical issues for engineering education and their impact on accreditation requirements.

Present critical issues on engineering education

Recent studies have informed reviews of engineering education conducted in several countries have had a major influence on the revision of national accreditation criteria for engineering programs. The new accreditation approach shifts emphasis away from "what is being taught" to "what is being learned". Engineering programs are now required to demonstrate that their graduates are achieving a set of specified learning outcomes, and the means of demonstrating this is left to each university to decide and implement. There are also some requirements in each country for increased management education, design education and industry relevance of programs. If the industry studies, accreditation criteria and reviews of engineering education are examined it is clear that the profession, the industry employers and the students themselves are calling for significant changes to the current philosophy and delivery of engineering education. What are the critical issues that need to be addressed? These can be summarised as follows:

- Engineering curricula are too focussed on engineering science and technical courses without providing sufficient integration of these topics or relating them to industrial practice. Programs are content driven.
- Current programs do not provide sufficient design experiences to students.
- Graduates still lack communication skills and teamwork experience and programs need to incorporate more opportunities for students to develop these.
- Programs need to develop more awareness amongst students of the social, environmental, economic and legal issues that are part of the reality of modern engineering practice.
- Existing faculty lack practical experience, hence are not able to adequately relate theory to practice or provide design experiences. Present promotion systems reward research activities and not practical experience or teaching expertise.
- The existing teaching and learning strategies or culture in engineering programs is out dated and needs to become more student-centred.

Methods to improve the higher education standards

- Practical based learning (pbl) technique
- Learning through case-studies
- Project-based learning in engineering
- Virtual and simulated learning modules.

Practical Based Learning (PBL) Technique

PBL is a teaching strategy that leads students to learn to learn and encourages students to develop critical thinking and problem solving skills that they can carry for life. [7] PBL is the search for solutions to life's messy problems. Problem-based learning (PBL) is an emerging teaching approach which has taken its prominence in higher education in recent years [8]. [9] PBL crosses a broad spectrum of instructional patterns, from total teacher control to more emphasis on self-directed student inquiry. It is a shift from the traditional didactic teaching where the core knowledge discovery process lies almost entirely in the hands of the learner rather than the faculty. Practical Based Learning is perceived to be a student centered approach to learning. Teaching is considered as an input directing the learning process. The problem is open ended and the focus is on the application and assimilation of previously acquired knowledge. In a project the production of an end product is the focus of the students.

TABLE 1 shows learning strategies differences between lectures and PBL

Strategies used more in lectures than PBL	**Strategies used more in PBL than lectures**
Using material from class sessions and objectives	Using library resources
Using recommended texts, basic science texts	Using general reference texts
Reading assigned material is useful	Preparing for class sessions
Taking notes in class sessions	Participating in class

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Regular review of class notes and Writing review notes in own words	When working in groups each person looks up one topic and then explains to others.

Principle Involved in PBL

- Principles of practical based learning in common are as follows:
- Student's work together in groups and collaborate on project activities.
- A real world problem that affects the life of the student's is presented for investigation.
- Student's discuss findings and consult the faculty for guidance, input, and feedback.
- The maturity level of student's skills determines the degree of guidance provided by the concerned faculties.
- Final products resulting from project-based learning can be shared with the community-at-large, thus fostering ownership and responsible citizenship in addressing real world problems.
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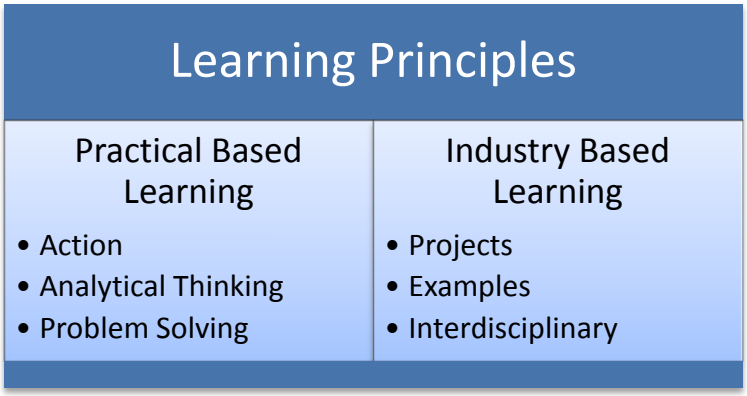

Figure 1: Differentiation of Practical Based Learning and Industry Based Learning

Project based Learning and Case-Studies

Learning is an active process of analysis and development based on the learner's interest, curiosity and experience and should result in expanded insights, knowledge and skills [13]. The approaches include new learning procedures which are learning approach, content approach and social approach. The learning approach as problem and project-based learning means that learning is organized around problems, the content approach concerns especially interdisciplinary learning and the social approach is team based learning [14]. One institution approach to project based learning may possibly look very much similar to another institution with adequate variance in the teaching methods and learning outcomes, assignment project appears in the more traditional learning concept but the project or problem is centered on the notion of learning which gives the learner the opportunity to be involve in learning process. From this observation, university projects are mostly discipline projects, which are pigeonholed by subjects chosen beforehand, and industry projects are claiming problem project that determines the self-directed learning process. Establishing a new educational practice requires not only an understanding of new learning principles, but also understanding content-based curriculum issues, students' collaborative-learning process, and the development of new concepts of project based learning knowledge while establishing new organizational and institutional practices [15]. An engineering project activity is carried out either in conjunction with industry or simulates a real engineering work environment, thereby contributing to Work Integrated Learning (Self-directed project based learning in small groups). Many of the characteristics and benefits of project-based learning make it a relevant pedagogical strategy in engineering education where realistic problems can be posed. Design is the vehicle for learning and an inductive mode of teaching can be employed [16]. Project-based learning shifts away from teacher directed learning to a more student centered learning activities that focus on real world issues and practices. Learning through projects, students get opportunities to interact with their colleagues and make new colleagues through cooperative projects [17].

The following graph indicates the Current Level of participation of students in Engineering Projects.

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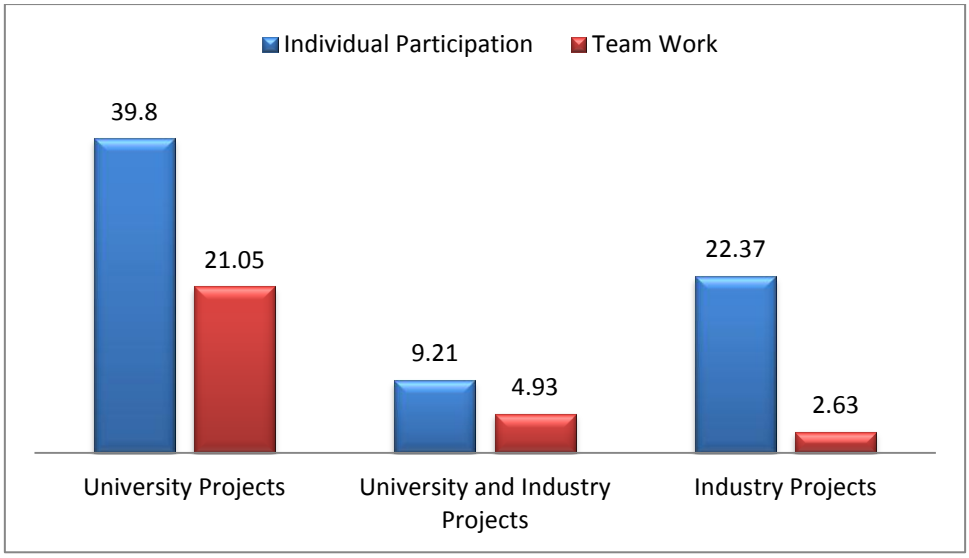

From the above graph mentioned represents that the individual participation is more when compared to team work. If practical based learning is employed in educational institutions, students not only get knowledge how to approach the problem but he also learns the essence of team work. This improves the quality of the fresh engineers and makes them readily employable.

Virtual and simulated learning modules

This virtual learning environment will enhance undergraduate engineering education by utilizing technology as a learning tool in lean, by fostering student development through active learning in the classroom, and through projects based on current real-world challenges, thus improving student learning, motivation, and retention. The paper highlights the learning modules to be developed in the virtual learning environment. The long-term goal is to evaluate the impact of the curriculum changes on student learning, outreach, and industrial collaboration.

The introduction of simulated learning exercises in a virtual environment would greatly increase the effectiveness of current curricula by providing greater access, standardization, and control than course projects, and greater depth and realism than manual simulations and also provide a wide challenge through increased emphasis on hands-on learning throughout its engineering curricula, taking first year students "out of a massive lecture hall" and immersing them in hands-on design processes through work in a new Ideas to Innovations Learning Laboratory, which includes a Design Studio, Innovation Studio, Rapid-Prototyping Studio, Fabrication and Artisan Laboratories, and Demonstration Studio. Given that children under 18 spend on average over an hour a day using computers, one of the hands-on instruction methods with the most potential to inspire and enhance the educational experience of the 'web generation', is the use of computer simulations and virtual environments

SBES - scientific and mathematical basis for the simulation of engineered systems

SBES is defined as the discipline that provides the scientific and mathematical basis for the simulation of engineered systems, and fuses the knowledge and techniques of traditional engineering fields—industrial, mechanical, civil, chemical, aerospace, nuclear, biomedical, and materials science—with the knowledge and techniques of fields such as computer science, mathematics, and the physical and social sciences.

The specific benefits of using computers for promoting active learning have been recognized for several decades. For instance, Squire documents the history of one type of virtual environment, video games, in the American culture and their introduction into education. Video games were first used for drills and practice games for factual recall, and have evolved into simulation and strategy games in order to model a system that is more consistent with the complexity of reality. Squire argues that video games enable learners to interact directly with a complex system, which helps the learner understand the system's dynamics. Evaluating the effectiveness of these virtual simulations has been the focus of other studies. For example, Freitas and Oliver evaluated the effectiveness of educational games and simulation with respect to their particular learning context and subject area. Their research presents a four-dimensional framework to evaluate the potential of using games- and simulation-based learning. The framework dimensions include context (classroom-based, outdoors, access to equipment, technical support), learner specific (learner profile, pathways, learning background, group profile), mode of representation (level of fidelity, interactivity, immersion), and pedagogic considerations (learning models used, approaches taken). The format of the framework helps educators evaluate potential games and simulations.

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Maintaining the quality of education through QFD

Quality function deployment (QFD) is a "method to transform user demands into design quality, to deploy the functions forming quality, and to deploy methods for achieving the design quality into subsystems and component parts, and ultimately to specific elements of the manufacturing process.

QFD is designed to help planners focus on characteristics of a new or existing product or service from the viewpoints of market segments, company, or technology-development needs. QFD involves receiving feedback from existing or new customers about their experience with the product and about the changes needed in it. Those are generally viewed as customer requirements.

Methods used in QFD to improve education standards

- Voice of requirement form the student
- House of quality
- Effect analysis
- Lean-Kaizen academics
- Six-sigma
- Trend analysis, etc

Voice of requirement form the student

House of Quality

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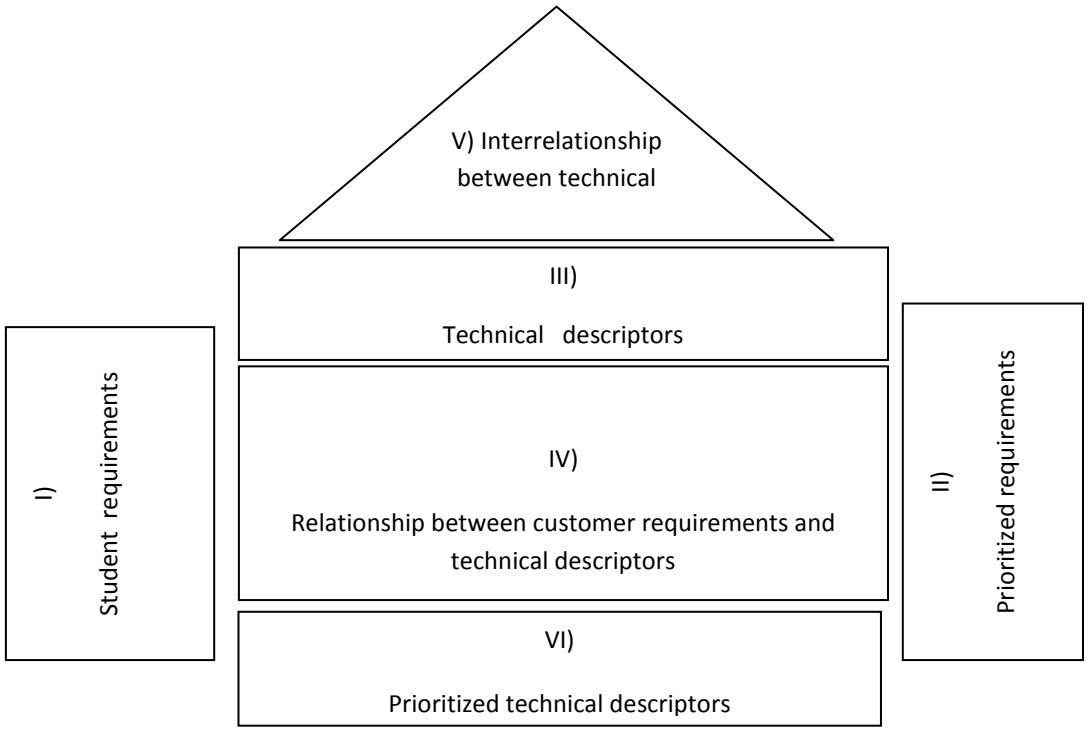

II CONCLUSION

The educational environment in many engineering colleges still remains predominantly instructive, regardless of the discipline, where as in a decentralized era, an age of which knowledge is available to anyone, anywhere, at any time professional life merges work and learning. It is a challenging task for academic staff to implement a project-based approach and integrate technology into projects in meaningful ways. It provides a framework for embedding experiential and rich learning activities, integrated with discipline-based curriculum that improves employment and career outcomes.

A good infrastructure alone will not ensure a quality education. It should also be accessible to each individual student in the institution. More the resources are accessible to a student, the more the knowledge he/she gains and more the outcome, which itself means that a quality education is being delivered to the student. In order to achieve this, Quality Function Deployment is a major tool that can be used effectively and efficiently.

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